BRITISH COLUMBIA
MINISTRY OF FORESTS

Tree Farm Licence 33

Issued to Federated Co-operatives Limited

Rationale for Allowable Annual Cut (AAC) Determination

Effective December 21, 2000

Larry Pedersen
Chief Forester

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Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 33. This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TFL

TFL 33, held by Federated Co-operatives Limited ('the licensee'), is situated north of Sicamous along the eastern shore of Shuswap Lake. It lies within the British Columbia Forest Service (BCFS) Kamloops Forest Region, is surrounded by the Okanagan Timber Supply Area (TSA) and is administered from the Salmon Arm Forest District Office in Salmon Arm.

TFL 33 is the smallest TFL in the province, with a total area of 8366 hectares. The TFL is situated in the Columbia wetbelt on the western slopes of the Shuswap mountain range, and the elevation within the TFL ranges from 347 metres to 1700 metres. It lies in the Interior Cedar Hemlock (ICH) and Engelmann Spruce Subalpine Fir (ESSF) biogeoclimatic zones. Stands on the TFL are composed of Douglas-fir, western redcedar, western hemlock, amabilis fir (balsam), Engelmann spruce and lodgepole pine, with minor components of western larch and western white pine.

The major communities close to the TFL are Salmon Arm and Sicamous. The TFL lies in the expressed area of interest of the Adams Lake, Neskonlith, Little Shuswap and Spallumcheen First Nations. TFL 33 is adjacent to and upslope of Shuswap Lake, a significant tourist destination in summer for house-boating and other water recreational activities such as water-skiing, power-boating and swimming. Because of the high recreational values around Shuswap Lake, the majority of the TFL land base is subject to visual quality constraints.

Wildlife species in the vicinity of TFL 33 include grizzly and black bear, mule deer and caribou. Several tributaries drain from the TFL into Shuswap Lake, which is home to numerous species of fish, including dolly varden, rainbow trout, chinook salmon, sockeye salmon, coho salmon and lake char.

Timber harvested from TFL 33 supplies six percent of the primary requirements for the licensee's mill in the nearby community of Canoe.

History of the AAC

TFL 33 was issued to Shuswap Timbers Limited in 1959 with an initial AAC of 10 900 cubic metres. In 1965, the AAC was increased to 12 880 cubic metres and in the same year the company was purchased by Federated Co-operatives Limited (Ltd.), although the official transfer of the quota did not occur until 1970. The AAC was increased in 1970 to 26 505 cubic metres and again in 1975 to 28 480 cubic metres, following the implementation of close utilization standards and to take into account

revised assumptions about rotation ages. It was again increased in 1983 to 29 000 cubic metres, largely as a result of improvements in available inventory information.

In 1988, the AAC was determined at 27 500 cubic metres, which by 1989 included 1450 cubic metres allocated to the Small Business Forest Enterprise Program (SBFEP). In July 1996, it was reduced by 18 percent to 22 500 cubic metres, the level in effect today, largely as a result of management requirements for visual quality. The SBFEP allocation has remained constant at 1450 cubic metres per year.

New AAC determination

Effective December 21, 2000 the new AAC for TFL 33 will be 21 000 cubic metres, a reduction of 6.7 percent from the current AAC. This AAC includes 1450 cubic metres allocated to the SBFEP.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of the present determination.

Information sources used in the AAC determination

Information considered in determining the AAC for TFL 33 include the following:

- *Statement of Management Objectives, Options and Procedures (SMOOP) for draft Management Plan No. 8*, TFL 33, accepted March 1, 1999;
- *Timber Supply Analysis Information Package*: *TFL 33*, Management Plan No. 8, Federated Co-operatives Ltd., accepted July 26, 1999;
- Existing stand yield tables for TFL 33, approved by BCFS Resources Inventory Branch, June 15, 1999;
- Managed stand yield tables and site index curves, approved by BCFS Timber Supply Branch, March 7, 2000;
- *TFL 33 Inventory Audit*, BCFS Resources Inventory Branch, April 1997;
- *Timber Supply Analysis Report: TFL 33*, Management Plan No. 8, Federated Co-operatives Ltd., accepted March 7, 2000;
- *Management Plan No. 8: TFL 33*, Federated Co-operatives Ltd., submitted December 22, 1999; resubmitted June 2000; approved August, 2000;
- *TFL 33, Twenty-Year Plan*, Federated Co-operatives Ltd., accepted March 1, 2000;
- Summary of public input solicited by the licensee regarding the contents of Management Plan No. 8;
- Visual Landscape Inventory, Salmon Arm Forest District, 1995/1996;
- *Landscape Unit Planning Guide*, Province of British Columbia (B.C.), March 1999;
- *Higher Level Plans: Policy and Procedures*, BCFS and Ministry of Environment, Lands and Parks (MELP), December 1996;
- *Okanagan Timber Supply Area Integrated Resource Management Timber Harvesting Guidelines*, BCFS, February 1992;

- *Procedures for Factoring Visual Resources into Timber Supply Analyses*, BCFS, March 1998;
- Technical review and evaluation of current operating conditions on TFL 33 through comprehensive discussions with BCFS staff, notably at the AAC determination meeting held in Victoria on March 15, 2000;
- Technical information provided through correspondence and communication among staff from BCFS and MELP;
- Technical information provided through comprehensive discussions with the licensee, notably at a meeting held in Victoria on April 26, 2000;
- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;
- Memorandum from the Minister of Forests to the Chief Forester, dated February 26, 1996, stating the Crown's economic and social objectives with regard to visual resources;
- *Forest Practices Code of British Columbia Act*, consolidated to June 1999;
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, consolidated to June 1999;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MELP;
- *Forest Practices Code, Timber Supply Analysis*, BCFS and MELP, February 1996.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for TFL 33, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. In making a large number of determinations for many forest management units over extended periods of time, administrative fairness requires consistency when addressing these changes and associated uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. If in some specific circumstance it is necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although the Forest Practices Code has been fully implemented since the end of the transition period on June 15, 1997, the timber supply implications of some of its

provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination I take this uncertainty into account to the extent possible in context of the best available information.

As British Columbia progresses toward the completion of strategic land use plans, the eventual timber supply impacts associated with land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy, and Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. In this regard, I am aware that the Okanagan-Shuswap LRMP has recently been ratified by the LRMP planning table and submitted to Cabinet for approval. However, since the outcomes of this and other planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions not yet taken by government. Thus I do not account for possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions. However, where specific protected areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base and are no longer considered to contribute to the timber supply in AAC determinations.

Forest Renewal British Columbia (FRBC) funds a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long-term. As with all components of my determinations, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs between 1992 and 1996. In any case, the

data and models available today are improved from those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgment to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent court decisions including those in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting those obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within TFL 33.

With respect to future treaty decisions, as with other land-use decisions it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from decisions that have not yet been taken by government.

Overall, in making AAC determinations, I am mindful of my obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of my responsibilities under the *Forest Practices Code of British Columbia Act*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TFL, a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model, a series of timber supply forecasts is produced, reflecting different decline rates, starting harvest levels, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TFL is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the

validity of the data and assumptions incorporated into the computer simulation used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgment, using current available information about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgment and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgments that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber supply analysis

The timber supply analysis for TFL 33 was prepared by Timberline Forest Inventory Consultants Limited under the direction of licensee staff. Timberline's proprietary model Continuous Area Simulation of Harvesting and Forest Management version 6.2 was used to conduct the analysis.

The CASH model can be used for either spatially-implicit or spatially-explicit timber supply analysis. For the analysis for TFL 33, the licensee used the spatially-implicit function of CASH. BCFS staff have reviewed the output of the model using a test database of spatially-implicit input information and assumptions, and have compared this information to results generated by the BCFS Forest Service Simulator (FSSIM) using the same test database and assumptions. Staff indicate that the outputs are similar and reasonable, and I am satisfied that the CASH model is capable of providing a reasonable projection of timber supply.

In the timber supply analysis, it was found that under the combination of constraints assumed in the base case that the initial harvest level could not meet the current AAC. The base case projected an initial harvest level of 8400 cubic metres per year, approximately 63 percent lower than the current AAC of 22 500 cubic metres. This initial harvest level was maintained for one decade, at which point the harvest level increased to 12 000 cubic metres per year. The long-term sustainable harvest level of 14 350 cubic metres per year was reached in decade nine.

Analysis results indicate that the initial harvest level is largely constrained by the assumptions applied for visual quality objectives. I am aware that if the harvest level projected in the base case were truly representative of the timber supply available under current management constraints, the implications for this AAC determination would be significant.

However, both district and licensee staff indicate that the visual quality assumptions applied in the base case are not reflective of current practice. As discussed in greater detail under *visually sensitive areas*, I conclude on this account that the base case does not provide me with a suitable assessment of available timber supply on TFL 33.

I requested additional information from both district and licensee staff in order to clarify current visual resource management practices and their implications to timber supply. The licensee provided additional sensitivity analysis to reflect available timber supply under varying levels of disturbance in visual areas. As also discussed under *visually sensitive areas*, I accept the assessment of district staff regarding what level of disturbance constitutes current practice for the visually sensitive areas on TFL 33. On this basis, I conclude that the sensitivity analysis in which a level of disturbance was assumed, which is equivalent to 5 percent more than the upper end of the range provided in provincial guidelines, provides me with a better assessment of the available timber supply on TFL 33 under current management than does the base case. At this level of allowable disturbance, the initial harvest level could be maintained for the first decade at 20 950 cubic metres per year before dropping in decade two to the long-term harvest level of 18 050 cubic metres per year.

In the original timber supply analysis as well as subsequent to it, in the additional information provided at my request by the licensee, various sensitivity analyses have been provided to assess the risk to timber supply resulting from uncertainty in data assumptions and estimates. These analyses have also assisted me in considering the factors leading to my determination.

As discussed and quantified throughout this rationale, and in consideration of the items described above, I am satisfied that the information presented to me provides an adequate basis from which I can assess the timber supply for this determination.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

The total area of TFL 33, as estimated from the licensee's inventory file, is 8366 hectares. Approximately 7678 hectares or 92 percent of this area is productive forest land.

As part of the process used to define the timber harvesting land base (i.e. the land base estimated to be economically and biologically available for harvesting), a series of deductions are made from the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for harvest for economic or ecological reasons. For TFL 33, the deductions result in a timber harvesting land base of 6979 hectares, or approximately 91 percent of the productive forest land.

My consideration of the deductions applied in the derivation of the timber harvesting land base is presented in the following sections of this rationale.

- non-productive and non-forested reductions

In the timber supply analysis, areas classified as non-forested or non-productive—alpine, alpine forest, lake, non-productive, river, swamp or urban areas—were deducted from the land base assumed to contribute to timber supply.

The BCFS Resources Inventory Branch conducted an inventory audit in 1995 which, among other things, assessed the non-forest classification for TFL 33. The audit found that the non-forest classification in the inventory file was correct in only 64 percent of samples. The audit concluded that portions of some polygons—and in some cases entire polygons—which were classified as non-productive or alpine forest in the inventory file were in reality productive forest land.

Following the audit, the licensee used aerial photo interpretation to review all non-productive areas on the inventory file and to reclassify areas where appropriate. They did not reassess the areas mapped as productive to determine if any of these areas should be considered non-productive. As a result of the review conducted, the total area excluded as non-productive or non-forested in the 1999 timber supply analysis was 513 hectares.

Areas classified as non-productive or non-forested often do not contribute to seral requirements for landscape level biodiversity. However, as noted in the *Landscape Unit Planning Guide*, alpine forest or non-productive forest classified with a species label may be considered to contribute to biodiversity requirements if these areas have been examined and determined to be suitable. On the basis of this statement, the licensee considered that 284 hectares of non-productive forest which was classified as alpine forest could be considered to contribute to old seral stage requirements for landscape level biodiversity. The implications of this assumption, and the concerns expressed by district staff regarding the assumption, will be discussed under *landscape level biodiversity* later in this rationale.

With the exception of the concern noted above, district staff indicate the exclusions applied for non-forested and non-productive areas on TFL 33 are reflective of current operational conditions on the TFL.

I have considered the information and am satisfied that the reductions were appropriate and suitable for use in this determination. However, given the observation above that the inventory data on non-productive and non-forested areas may still be subject to some uncertainty, I request that prior the next determination for TFL 33, the licensee assess those areas currently classified as forested in order to ascertain whether any of these areas may require reclassification to non-productive.

- economic and physical operability

Those portions of the TFL which are not physically accessible for harvesting, or which are not feasible to harvest economically, are categorized as inoperable and are excluded when deriving the timber harvesting land base.

New operability mapping for TFL 33 which included an indication of harvest method was requested as a condition of the acceptance of Management Plan Number 7. The operability mapping was completed by the licensee and submitted to the Salmon Arm forest district manager for approval in 1998. However, due to some ambiguity in the methodology, the mapping was not approved by the district manager until May 2000, and as a result was not used in the timber supply analysis.

In the timber supply analysis, reductions were applied for sensitive soils using environmentally sensitive area (ESA) information, which accounted for considerations of terrain stability, accessibility and slope. Approximately 129 hectares identified as highly sensitive to soil disturbance were 100 percent excluded from contributing to the land base.

District staff believe that the maximum operable slope reflective of true operating conditions on the TFL is 70 percent. The slope class groupings used in the analysis included one class comprising 265 hectares with slopes between 60 and 75 percent which was entirely retained in the timber harvesting land base. District staff indicate that any area with a slope greater than 70 percent should not be considered to contribute to timber supply. It is not known how much of the 265 hectares in the described slope class may have slopes in excess of 70 percent.

I have reviewed the information regarding operability in TFL 33 and agree with the district's assessment that areas with greater than 70 percent slope should not be included in the timber harvesting land base. I note that the size of the area classified with slope greater than 70 percent is at most 265 hectares, or 4 percent of the timber harvesting land base, and in all likelihood comprises only a fraction of that area. I am mindful of the uncertainty associated with the operability of these areas and of the small risk posed to timber supply as a result of their inclusion in the timber harvesting land base, and will discuss this further under 'Reasons for decision'.

I request that the licensee staff review their operability data prior to the next determination for TFL 33 to ensure all areas with inoperable slopes are excluded from the

timber harvesting land base for the next analysis. I also encourage district and licensee staff to work together to resolve any outstanding issues regarding the methodology used to conduct the operability mapping, so that this information can be incorporated into future timber supply reviews.

- roads, trails and landings

In the analysis, a percentage of the productive forest considered available for harvesting was excluded to account for loss of productive forest land as a result of the construction of roads, trails and landings. Separate estimates were made for existing roads, trails and landings, and future roads, trails and landings, to reflect both potential changes in road building practices and road network requirements over time, and the access that the existing network of roads will provide for future harvesting operations. Estimates account for the area that is permanently removed from the timber harvesting land base.

To account for existing roads and trails, the percentage of productive forest lost was estimated using the lines that represent roads within the geographic information systems (GIS) database for TFL 33. The lines were buffered with average width estimates based on field samples of various road categories. An estimate was also prepared to account for landings. In total, 137 hectares were deducted from the productive forest land base to account for existing roads, trails and landings. District staff have reviewed the methodology and the deductions and state that they are representative of current conditions on TFL 33.

The licensee assumed in the analysis that future road construction would be limited to spur roads, as all mainline and secondary roads on the TFL have been constructed. The licensee estimated that two percent of the previously roaded timber harvesting land base is currently occupied by spur roads, and a further two percent is occupied by landings. To account for roads and landings that will be built in the future, these percentages were applied in the analysis as reductions over time to the unroaded timber harvesting land base. A total of 189 hectares were deducted over the analysis horizon. District staff have reviewed the methodology and reductions applied for future roads and believe then to be reasonable.

I have reviewed the information regarding roads, trails and landings, and I am satisfied that the accounting for both future and existing roads in the analysis was appropriate, and suitable for use in this determination.

- sites with low timber growing potential

In order to determine the timber harvesting land base, sites with low productivity as a result of inherent site factors such as nutrient availability, exposure, excessive moisture, or that are not fully occupied by commercial tree species are removed from the productive forest land base.

In the timber supply analysis, sites with low timber growing potential were considered to be those sites occupied by stands which could not produce a minimum coniferous volume of 200 cubic metres per hectare by 160 years of age. This was correlated to a minimum site index (measured in metres of height at 50 years of age) for each species, and as a

result a total of 101 hectares were excluded in the analysis to account for sites with low timber growing potential.

District staff believe that the assumptions regarding low productivity sites are reasonable and representative of current practice. I have discussed the information with them and I am satisfied that there has been an appropriate accounting for low productivity sites for this determination.

- environmentally sensitive areas

An environmentally sensitive area (ESA) is identified during a forest inventory as an area that is sensitive to disturbance and/or is significantly valuable for fisheries, wildlife, water and recreation resources. ESA information is used to identify land to exclude from the timber harvesting land base where more specific or detailed information is not available about a particular forest resource.

In the timber supply analysis, ESA information was used to determine appropriate reductions to apply for sensitive soils, as discussed under *economic and physical operability*. Other resource values such as wildlife habitat and visual quality were addressed through the forest cover constraints or other reductions applied in the analysis, and are discussed under the appropriate sections of this rationale.

Public input expressed some concern about the stability of slopes behind lakeshore cabins should logging occur in the areas. The licensee has indicated awareness of the concerns and states in their management plan that the concerns will be addressed in the operational planning process.

The licensee completed Level D terrain stability mapping in 1998, and expects to complete Level C mapping in the near future. I note that completion of the Level C terrain stability mapping should provide better information about the slope stability for those portions of TFL 33 about which concern has been expressed. I accept the licensee's commitment to handle any slope stability concerns through operational planning, and I am also aware that provisions of the Forest Practices Code serve to define allowable practices on specific classes of terrain.

For this determination, I am satisfied that the information used in the analysis regarding sensitive soils was the best available information and that no additional accounting is required.

- problem forest types

Problem forest types are typically defined as stands which are physically operable and exceed low site criteria and yet are not currently utilized or have marginal merchantability. These types are either wholly or partially excluded from the timber harvesting land base for the analysis.

Problem forest types on TFL 33 are primarily those stands with a significant component of birch or aspen. In the analysis, approximately 150 hectares of deciduous-leading stands were excluded from the timber harvesting land base, and all deciduous volume in coniferous-leading stands was excluded through reductions applied to the yield tables.

District staff confirm that volume from deciduous species is not currently utilized on TFL 33.

From review of the information, I am satisfied that the assumptions regarding deciduous species are appropriate and reflective of current conditions on the TFL.

Existing forest inventory

The inventory data used for the timber supply analysis was collected during a forest inventory completed in 1981 for TFL 33. For the analysis, the inventory file was updated to December 1998 to account for growth, disturbances such as harvesting and fire, and for silvicultural treatments.

An inventory audit was conducted in 1995 by the BCFS Resources Inventory Branch, which reviewed:

- the mature component of the inventory, assessing differences between the existing inventory's estimate of mean mature volume per hectare for the TFL and a new estimate obtained from the audit samples;
- the immature component, testing site index assignment; and
- the non-forest component, testing the non-forest classification assignment.

I have discussed the results of the audit under *volume estimates for existing stands* and *non-productive and non-forested reductions.* I have considered the information regarding the current forest inventory used in the timber supply analysis, and am satisfied that—subject to the discussion in this rationale—it forms an acceptable basis for this determination.

- age-class structure

Age-class structure data from the inventory file is used in the analysis to project forest stand conditions over time. Assumptions about age classes can impact timber supply at any point in the analysis horizon since they form the basis against which minimum harvestable ages, green-up requirements and other forest cover constraints are applied.

The existing age-class structure of the stands on TFL 33 is reflective of the harvesting history of the area. Approximately 28 percent of the timber harvesting land base is occupied by stands less than 40 years of age.

I have reviewed the information regarding age-class structure and see no concerns which would impact this determination.

- species profile/harvest profile

The dominant tree species on TFL 33 are Douglas-fir, western redcedar, western hemlock, Engelmann spruce, balsam and lodgepole pine. Stands also contain some minor components of western white pine and western larch. The species harvested over time reflect to some extent the pattern of development on the TFL. Engelmann spruce formed a significant component of the harvest in early harvesting history as the portions of the TFL in the ESSF biogeoclimatic zone were the first to be developed operationally.

In the analysis, no specific harvest profile constraints were applied. District staff have identified no concerns regarding the profile of timber harvested in comparison to the species known to be present on the TFL.

I have reviewed the species profile information for TFL 33 and am satisfied that it was adequately represented in the timber supply analysis assumptions.

- volume estimates for existing stands

Two growth and yield models were used to estimate timber volumes for the TFL 33 timber supply analysis. The Table Interpolation Program for Stand Yields (TIPSY) model developed by the BCFS Research Branch was used to estimate yields for all managed stands, which is discussed under *volume estimates for managed stands*.

Existing natural stand volumes were estimated and projected using forest inventory attributes and the Variable Density Yield Prediction (VDYP) model (version 6.4), which was developed by the BCFS Resources Inventory Branch. The volumes for existing natural stands in which species and stocking have not been managed—defined as those stands older than 33 years of age—were projected using this model. Once a stand was harvested for the first time in the analysis, its future growth and yield was projected using estimates from the managed stand yield tables.

The existing stand yield tables were reviewed and approved by the BCFS Resources Inventory Branch as appropriate for use in the analysis.

As mentioned under 'Existing forest inventory', an audit was conducted on the mature component of the forest inventory. The audit assessed differences between the existing inventory's estimate of mean mature volume per hectare for the TFL and a new estimate obtained from the audit samples, and found no statistically significant differences. The results of this audit provide some assessment of the reliability of the volumes projected for existing natural stands in the timber supply analysis.

I have reviewed the information regarding existing stand yields and am satisfied that yields projected in the analysis are reflective of current stand conditions on TFL 33, and are appropriate for use in this determination.

Expected rate of growth

- site productivity estimates

Inventory data includes estimates of site productivity for each forest stand, expressed in terms of a site index. The site index is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

In general, in British Columbia, site indices determined from younger stands (i.e. less than 31 years old), and older stands (i.e. over 150 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent

weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—such as the old-growth site index or OGSI project—suggest that actual site indices may be higher than those indicated by existing provincial inventory data from old growth forests. Studies include those known as 'paired-plot'—where plot samples from an old-growth stand and the adjacent second growth stand are compared—and a provincial veteran tree study. It has been consistently concluded from such studies that site productivity has generally been underestimated; managed forest stands tend to grow faster than projected by inventory-based site index estimates from old-growth stands.

One paired plot study has been conducted in the Kamloops Forest Region, the results of which could potentially apply to TFL 33. However, the possible site index adjustments using data from the study were limited to lodgepole pine and spruce, and were applicable to only 99 hectares of stands older than 140 years of age on TFL 33. As a result, no old growth site index adjustments based on this study were applied in the base case.

The licensee for TFL 33 has not conducted any localized site index studies for any species, but acknowledges in Management Plan Number 8 that site index assignments on the TFL require further review.

Given that TFL 33 includes highly productive forest in the ICH biogeoclimatic zone, I anticipate that any localized information that can be obtained will indicate that site productivity is underestimated, which could serve to increase or stabilize timber supply. I encourage the licensee to obtain better site productivity information for the next timber supply review, such that any data can be incorporated into future analyses.

For this determination, I will take into account the potential upward influence of improved site productivity estimates on timber supply, and will discuss this further in my 'Reasons for decision'.

- *volume estimates for managed stands*

In the analysis, the TIPSY growth and yield model was used to estimate volumes for managed stands. Managed stands for TFL 33 were defined as all existing stands 33 years of age or less, and all stands regenerated in the future. The managed stand yield tables were reviewed and approved by Timber Supply Branch staff with growth and yield expertise and found to be appropriate for use in the analysis.

District staff have reviewed and agree with the analysis assumptions regarding the expected yields from managed stands. Having discussed the information with district and Timber Supply Branch staff, I see no issues which would impact on this determination.

- *operational adjustment factors*

TIPSY projections are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition in the stand. Certain operational conditions, such as less than ideal tree distribution, small non-productive

areas, endemic pests and diseases, or age dependent factors such as decay, waste and breakage may cause yields to be reduced over time. Operational adjustment factors (OAFs) are applied to yields generated using TIPSY to account for losses of timber volume as a result of these operational conditions. OAF 1 can account for factors affecting the yield curve across all ages, such as small stand openings. OAF 2 can account for factors whose impacts tend to increase over time, and whose influence on a stand may often be reduced through management practices, such as pests, disease, decay, waste and breakage.

In the analysis, the standard provincial reductions of 15 percent for OAF 1 (accounting for less than ideal tree distribution, small non-productive areas, endemic pests and disease, and random risk factors such as windthrow), and 5 percent for OAF 2 (accounting for decay, waste and breakage) were applied.

In the Interior Cedar Hemlock (ICH) biogeoclimatic zone, root rot disease is endemic in many stands and is expected to impact the volumes for stands regenerating on these sites. Approximately two-thirds of the TFL lies in the ICH biogeoclimatic zone.

The timber supply review for the Okanagan TSA, which surrounds TFL 33, is currently in progress. In the data preparation for that analysis, BCFS Kamloops Forest Region staff derived volume estimates for regenerating stands in the Douglas-fir leading and western redcedar-leading inventory type groups in the ICH zone, based on field assessment data from the TSA. OAF 1 and OAF 2 values for these stands were derived using the estimates for expected volume, and then applied in the analysis to approximate the impact of endemic root rots in these stands for the Okanagan TSA.

Although no specific data exists for the incidence of root rot in the stands on TFL 33, the regional forest pathologist indicates that for those types of stands suspected to be susceptible, the impact of root disease is likely to be similar to that in the TSA.

Sensitivity analyses were not conducted to determine the impact of applying the OAF percentages used in the Okanagan TSA analysis to the appropriate managed stand yield curves. Standard sensitivity analysis which evaluated the timber supply impacts of a 10 percent decrease in managed stand yields across all stands—which equates to an additional 10 percent OAF 1 adjustment—showed less than a 10 percent impact to the harvest level occurring after 150 years. If the losses estimated to result from root rots in the stands on TFL 33 were similar to those applied to stands in the Okanagan TSA, a greater than 10 percent yield reduction would likely be required for the affected stands.

From review of the information, I believe it is very likely that there will be additional volume impacts to second growth stands in the TFL which was not accounted for in the analysis. Whether the OAF values applied in the Okanagan TSA analysis to account for root rot volume losses in managed stands are also applicable to TFL 33 is uncertain. I note that while uncertainty in managed stand volume estimates does not affect short-term timber supply, there is some risk posed to mid- and long-term timber supply on the TFL on account of this factor.

I request that the licensee clarify the issue and the related management objectives prior to the next determination, as well as provide an estimate of the incidence of root rots and

associated losses on TFL 33. This information can then be taken into account in the assumptions for future analyses.

For this determination, I will take into account the risk of an unquantified downward pressure on mid- to long-term timber supply, and I will discuss it further in 'Reasons for decision'.

- minimum harvestable ages

A minimum harvestable age is an estimate of the earliest age at which a forest stand has reached a harvestable condition and has met minimum merchantability criteria. The minimum harvestable age assumption largely affects when second growth stands will be available for harvest. In practice, many forest stands will be harvested at older ages than the minimum harvestable age, due to economic considerations and constraints on harvesting which arise from managing for other forest values such as visual quality, wildlife and water quality.

At the time of the previous determination for TFL 33, concerns were expressed regarding the relatively low minimum harvestable ages for some stands. The licensee has since reviewed operational performance and revised the criteria, concluding that the minimum harvestable ages used for the last analysis were likely too low. For the 2000 timber supply analysis, the licensee based the minimum harvestable ages on the age at which a stand's volume increment was maximized (i.e., maximum mean annual increment). Use of the maximum mean annual increment criteria results in older, and therefore more constraining ages, than those in the previous timber supply analysis.

Sensitivity analysis which tested the impacts to timber supply of increasing or decreasing the ages by 10 percent found timber supply is relatively insensitive to minimum harvestable ages. In the modelling, stands were rarely harvested close to their minimum harvestable ages due to the constraints on the land base from other factors. However, I am aware that the sensitivity of the base case to uncertainty in minimum harvestable ages is likely low as a result of the high level of constraint from the assumptions applied to account for visual quality objectives over much of the TFL land base. The harvest forecast may exhibit a higher level of sensitivity to minimum harvestable ages under a different combination of constraints.

I have reviewed the assumptions used to determine minimum harvestable ages for the stands on TFL 33. I acknowledge that predicting the ages at which stands may be harvested in the future is difficult and subject to considerable uncertainty. It is likely that some stands could be harvested below culmination age, a practice which could increase medium term timber supply. Having considered the methodology applied in the analysis, I accept the minimum harvestable ages modelled in the base case as satisfactory for use in this determination. However, I recommend the licensee continue to review and refine the assumptions for minimum harvestable ages, including continued assessment of value and volume criteria, to ensure that the best available information is incorporated into future timber supply analyses.

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

Expected time for forest to be re-established following harvest

- regeneration delay

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In timber supply analysis, regeneration delay is used to determine the starting point of tree growth for the yield curves which project volumes over time.

A two year regeneration delay was assumed in the timber supply analysis. The licensee indicates in their management plan that the majority of harvested sites are planted within the first year after harvest using primarily one year old stock, and a species combination of Douglas-fir, lodgepole pine, Engelmann spruce and western larch.

Although for some sites, regeneration delay may be slightly less than modelled, district staff accept that the analysis assumptions regarding regeneration delay were appropriate and reasonably reflective of current practice. Sensitivity analysis in which regeneration delay was decreased by two years showed short- and mid-term timber supply could increase by approximately 200 cubic metres per year.

I accept that regeneration delay may be slightly less than the two years modelled in the analysis. However, it has not been overestimated to the magnitude tested by the sensitivity analysis, the results of which in any event indicate that timber supply is largely unaffected by small reductions in the length of regeneration delay. For this determination, I consider that the assumptions regarding regeneration delay were appropriate and make no adjustments on this account.

- impediments to prompt regeneration

Impediments to prompt regeneration which are not accounted for in the analysis could increase the uncertainty in the growth and yield assumptions used in the timber supply analysis.

No impediments to prompt regeneration have been identified by the licensee on TFL 33. District staff indicate that some of the areas harvested by cable on steeper terrain are difficult to regenerate. In Management Plan Number 8, the licensee has stated that to address regeneration considerations, such areas are planted immediately following harvest using larger stock, and without the mechanical site preparation typically carried out elsewhere on the TFL.

I have reviewed the information on regeneration impediments and am satisfied that there are no issues which would impact this determination.

- not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are those areas where timber has been removed, either by harvesting or by natural causes, and a stand of suitable forest species and stocking has yet to be established. Where a suitable stand has not been regenerated and

the site was harvested prior to 1987, the classification is 'backlog' NSR. All other NSR is considered 'current' NSR.

There are 93 hectares of current NSR and no backlog NSR on TFL 33. Data on the site indices for the current NSR areas have not yet been collected, and in the analysis these stands were assigned to the medium site classes for natural stands of similar species groups, based on the inventory file data.

District staff believe that the estimate of current NSR is reasonable and agree with the assignment of the area to the medium site classes.

I note that the estimation of 93 hectares of current NSR is consistent with the estimated regeneration delay on the TFL. Based on my review of the information, I accept that NSR areas have been appropriately accounted for in the analysis.

(iii) silvicultural treatments to be applied to the area:

Silvicultural treatments to be applied

- silvicultural systems

For the purposes of the analysis, it was assumed that all harvesting would be modelled using clearcutting silvicultural systems (i.e., removal of all of the volume associated with the area harvested). Other requirements under the Forest Practices Code for riparian reserves and wildlife tree patch areas, as well as forest cover constraints such as green-up and adjacency restrictions were also factored into the analysis and are discussed further under the appropriate sections in this rationale.

Operationally, clearcut with reserves has been the predominant silvicultural system used on TFL 33, although the licensee plans to phase in group selection for specific areas of the TFL. Smaller cutblocks are used to meet specific management objectives such as those for deer winter range and visual quality. The average proposed cutblock size described in the 1998-2003 Forest Development Plan (FDP) is 6.9 hectares.

Some single tree selection has been conducted during bark beetle salvage operations on the TFL, although the use of this system is limited by root rot concerns.

As mentioned under Timber Supply Analysis and *visually sensitive areas*, current practice is reflected by a level of allowable disturbance which is five percent higher than the upper limit of the range described in current guidelines. I note that this level of allowable disturbance is dependent on the use of alternative silviculture systems such as small patch cuts, as the application of partial cutting or patch cutting regimes is often considered to be acceptable grounds for exceeding the disturbance guidelines. The licensee commits in their management plan to the use of these systems where appropriate for the harvest of timber on TFL 33. District staff indicate that the suitability of partial harvesting systems must be determined on a site specific basis, due to the presence of root rots in some stands on the TFL.

I have reviewed the information regarding silvicultural systems and current practices on TFL 33. For this determination, I am satisfied that the assumptions in the analysis

adequately reflect operational practices, and are appropriate. Any information which becomes available over time regarding the increased use of partial harvesting systems can be incorporated into a future analysis.

- incremental silviculture

Incremental silviculture includes activities such as commercial thinning, juvenile spacing, pruning, fertilization, and genetic improvement that are beyond the silviculture activities required to establish a free-growing forest stand.

1) genetically improved seed

The Forest Practices Code requires the use of improved (class A) seed from seed orchards for regeneration where available. Class A seed is the product of B.C.'s forest genetics program, which uses standard domestication/breeding techniques to select naturally-occurring and well-performing trees.

For the analysis, genetic gain adjustment values were provided by the BCFS Skimikin Seed Orchard for both current and future nursery stock. Current gain values were provided for spruce (4 percent), lodgepole pine (6 percent), western larch (3 percent) and Douglas-fir (0 percent). The adjustments applied in the base case were for current gains only and were applied by adjusting the site indices—and therefore the heights—following harvest for future managed stands. The genetic gains were applied only to regenerated stands on sites harvested in 2000 and beyond.

Although additional genetic gains are expected in the future, these future gain values were not used in the base case. The impact of future gains on timber supply was assessed through sensitivity analysis in which fertilization results were combined with genetic gains. BCFS Timber Supply Branch staff reviewed the sensitivity analysis, and question some of the assumptions used to attempt to account for the dynamics of the expected gains. As such, I consider the sensitivity analysis results to be not suitable for this determination.

Currently only class A spruce seed is used for planting programs on the TFL. The licensee plans to use improved seed for other species as they become available. District staff note that the analysis assumptions regarding the use of spruce seed adequately reflect current practice, but have concerns about the assumed use of seed from other species which are either not yet available or not used on TFL 33.

BCFS Tree Improvement Branch staff indicate that the gains applied in the base case are consistent with what is currently available from nurseries for lodgepole pine and western larch. In addition, they note the gains applied for spruce were perhaps a bit lower than what is expected from the available spruce seed.

I have considered the analysis assumptions for class A seed. Although improved seed from spruce only has been used thus far on the TFL, the licensee commits in their management plan to use improved seed whenever available. I expect that class A seed from these other species will be used in the near future. Given that the analysis assumed use of the seed from the year 2000 onwards, I am satisfied that the analysis assumptions are a reasonable approximation of current practice.

For this determination, I accept that the base case assumptions are appropriate. I encourage staff to continue to monitor trends such that any additional information can be used in future determinations. As the tree improvement program expands, it does provide cause for optimism that timber supply could benefit from the further use of class A seed.

2) fertilization and juvenile spacing

Fertilization is the application of nutrients in a stand to enhance the growth of individual trees. On TFL 33, fertilizer has been experimentally applied to spruce and Douglas-fir stands encompassing approximately 170 hectares of the timber harvesting land base. Due to the small scale application of fertilizer operationally, its use was not incorporated into the base case assumptions.

Juvenile spacing involves cutting less desirable trees within a young stand to reduce competition among the residual trees for water, nutrients and sunlight. Trees cut during juvenile spacing are not usually removed from the site, and the volume does not contribute to timber supply. Spacing can have many potential benefits, including meeting biodiversity or wildlife habitat objectives, maintaining or enhancing forest health, managing species composition and stand structure, increasing stand value and offering employment opportunities for small operators. Between 1987 and 1997, 505 hectares were juvenile spaced on TFL 33, although no spacing was conducted in 1998 and 1999.

In the analysis, managed stands were assumed to be juvenile spaced as necessary to achieve target spacing of 1500 stems per hectare. No spacing was assumed beyond this base level. District staff are satisfied that the assumptions are consistent with current practice on the TFL. I have considered the information and I see no concerns which would impact on this determination.

3) commercial thinning

Commercial thinning is a partial cutting silvicultural system in which some volume is removed from an immature stand after components of the stand have reached a merchantable size. The volume removed during the commercial thinning is sold and therefore contributes to timber supply. Commercial thinning activity may not significantly affect timber supply but does offer increased flexibility with respect to timing and location of harvest.

No commercial thinning is currently conducted on TFL 33, and none was assumed in the timber supply analysis. District staff confirm that the modelling assumptions reflect current practice.

I am aware that the current age class structure on the TFL contains few stands suitable for commercial thinning. I am satisfied that the assumptions regarding commercial thinning were appropriate, and make no adjustments on account of this factor.

- stand conversion

Currently on TFL 33, existing balsam-leading stands are converted to spruce-leading stands following harvest. Some balsam typically regenerates naturally, such that the resulting stand is spruce-leading with a minor component of balsam. As it represents

current practice, this stand conversion was modelled in the timber supply analysis. Approximately 700 hectares of the timber harvesting land base are occupied by balsam-leading stands. The site indices for the converted stands were calculated using an acceptable procedure provided by the BCFS Research Branch.

MELP staff have expressed concern about stand conversion, indicating that their current policies recommend no net loss of plant communities in order to protect wildlife habitat, particularly for caribou and other ungulates.

I have considered the information and am satisfied that current practice was appropriately modelled in the analysis. I am aware of the concerns raised by MELP staff, which have also been expressed elsewhere for other units in the province. I understand that the issue is expected to be resolved through the Okanagan-Shuswap LRMP, which will eventually guide operational planning once its recommendations are approved.

Any additional information which becomes available over time can be factored into future analyses. For the purposes of this determination, I am satisfied that current practice was modelled appropriately and make no adjustments in this regard.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area:

Timber harvesting

- utilization standards and compliance

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. In the timber supply analysis, the utilization standards assumed in the base case for most species were a minimum 17.5-centimetre diameter at breast height (dbh) with a 30-centimetre maximum stump height and 10-centimetre minimum top diameter inside bark. For lodgepole pine stands, the minimum dbh standard used was 12.5 centimetres.

District staff state that these assumptions are consistent with regional standards. They note that operationally, the utilization standard for mature western redcedar is relaxed to a 15-centimetre minimum top diameter inside bark. As I have noted in rationales for other determinations, a review of this issue has shown that this difference in utilization standards has a negligible impact on timber supply.

I am satisfied that the utilization standards applied in the analysis are reasonably reflective of current practice, and make no adjustments in this regard.

- decay, waste and breakage

For managed stand yield curves, as previously discussed (see *volume estimates for managed stands*), the TIPSY model incorporates OAFs that account for anticipated decay, waste and breakage.

For existing stand yield curves, the VDYP model which is used to project volume incorporates estimates of volume of wood lost to decay, waste and breakage. Decay

losses are built into the volume estimates, while standard waste and breakage factors are incorporated into the analysis when developing VDYP yield curves. These estimates of losses have been developed for different areas of the province based on field samples. In the analysis for TFL 33, local factors for western redcedar and hemlock were obtained from special cruise 339 based on the Eagle public sustained yield unit (PSYU) 150. The factors were accepted by the BCFS Resources Inventory Branch as suitable for use.

I have reviewed the information presented and am satisfied that there has been appropriate accounting for decay, waste and breakage in existing stands.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production:

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

To manage for resources such as water quality and aesthetics, current harvesting practices limit the size and shape of cutblocks and maximum disturbances (areas covered by stands of less than a specified height), and prescribe minimum green-up heights required for regeneration on harvested areas before adjacent areas may be harvested. Green-up requirements provide for a distribution of harvested areas and retention of forest cover in a variety of age classes across the landscape.

- cutblock adjacency/green-up

Objectives for forest cover and cutblock adjacency guide harvesting practices in order to address resource values such as wildlife habitat and visual quality. The adjacency objectives modelled in the analysis address minimum green-up height required before an adjacent area may be harvested, and the maximum area permitted to be covered with stands less than the minimum green-up height.

In the timber supply analysis, the age to green-up was derived from BCFS height growth curves using the minimum heights for each of the zones. A 3 metre green-up height was applied to the IRM portion of the landbase. No more than 35 percent of the stands in the zone could be less than 3 metres in height at any one time.

Green-up heights in the visually sensitive areas, which applied to 76 percent of the timber harvesting land base, are discussed in the next section of this rationale. District staff agree that the height assumptions for the IRM areas adequately reflect current practice.

Sensitivity analysis which assessed the timber supply impacts of increasing or decreasing green-up heights for the entire timber harvesting land base (including visually sensitive areas) by 20 percent showed that short-term timber supply is sensitive to changes in

green-up heights. Although no specific issues have been identified, given the sensitivity shown in the analysis the licensee may wish to accumulate further field information on the age to green-up exhibited by stands in current practice. Any refinements in the information can be factored into future analysis.

For this determination, I accept that green-up in the IRM areas was modelled appropriately and make no adjustments on account of this factor.

- visually sensitive areas

Careful management of scenic areas visible from communities, public use areas and travel corridors is an important management objective. The Forest Practices Code enables the management of visual resources by providing for scenic areas to be identified and made known, and by providing for the establishment of visual quality objectives (VQOs) that guide the management practices on a scenic area. To achieve this, visual landscape inventories are carried out to identify, classify and record visually sensitive areas. On completion of such an inventory, a specialist may derive recommended visual quality objectives (RVQOs) of preservation, retention, partial retention, modification or maximum modification to identify levels of alteration that would be appropriate for particular areas. The Forest Practices Code requires visually sensitive areas to be identified by the district manager or in a higher level plan, and to be made known to licensees. The district manager or a higher level plan may also establish the recommended VQOs.

TFL 33 lies on the shores of Shuswap Lake where visual quality is an important resource value. Approximately 76 percent (5289 hectares) of the timber harvesting land base of TFL 33 is considered visually sensitive. Scenic areas have been made known for TFL 33, and the RVQOs have been proposed (approximately 3900 hectares in the partial retention zone), but the VQOs have not yet been formally established. The recommended objectives for visual quality were made known to licensees through a letter issued by the district manager in 1997, which requested that licensees manage for visual quality in accordance with the 1995 visual landscape inventory data including the RVQOs. The Okanagan Shuswap LRMP, once finalized and formally approved by government, is expected to provide additional guidance for visual quality management on the TFL.

In visually sensitive areas, licensees design cutblock shape and form to be consistent with the surrounding landscape to varying degrees depending on the VQO. Guidelines to meet VQOs include setting a maximum percentage of a landform allowed to be in a disturbed state at any one time (from a 'perspective' view), and setting visually effective green-up (VEG) targets that must be achieved before additional harvesting is permitted. VEG refers to the stage at which a stand of forested timber is perceived to be satisfactorily greened-up from a visual standpoint.

Perspective view disturbance values provide a true indication of the existing visual condition and whether visual quality objectives are being achieved. They are, however, difficult to use in timber supply modelling and operational planning. In timber supply analysis, 'planimetric' (plan) view—which essentially describes a flat map view with no contours—percent alteration values for VQOs are used in the modelling of clearcut

harvesting operations. The ratio between perspective and plan view alteration percentages is variable dependent on view locations, terrain, and forest operations.

A provincial average plan view allowable alteration percent range for each VQO was developed by BCFS specialists for use in timber supply analysis. The ranges and methods used in the base case for accounting for visually sensitive areas on TFL 33 are described in the *1993 Procedures for Factoring Recreation Resources into Timber Supply Analyses*. The *1992 Okanagan Timber Supply Area Integrated Resource Management Timber Harvesting Guidelines* (OKTHG), which are used to guide operational planning, provide the same allowable alteration percentage ranges as these provincial procedures.

For the TFL 33 analysis, the RVQOs from the 1995 visual landscape inventory were used in the base case, and the maximum allowable plan view disturbance for each VQO was modelled at the midpoint of the provincial average range. The modelled plan view percentages for maximum allowable disturbance were as follows:

- one percent of the area in the retention VQO zone could be covered with stands less than 6 metres in height (22 years of age);
- ten percent of the area in the partial retention VQO zone could be covered with stands less than 5 metres in height (20 to 23 years of age); and
- 21 percent of the area in the modification VQO zones could be covered with stands less than 5 metres in height (23 to 25 years of age).

As described under Timber Supply Analysis, the base case harvest forecast indicates that timber supply on TFL 33 is highly constrained by the maximum allowable disturbance in VQO zones assumed in the model. The initial harvest level attained in the base case was 8400 cubic metres per year, 63 percent less than the current AAC.

Review of the analysis results revealed that the maximum allowable disturbance percentage assumed in the base case were exceeded in the visually sensitive areas at the start of the forecast period, allowing no further harvesting in these zones in the model until visually effective green up conditions were met (in ten to twenty years) on the disturbed areas.

However, district staff indicate that the use of the midpoint of the range outlined in provincial guidelines (as described above) for allowable disturbance in each visual quality zone—most specifically, assuming 15 percent maximum disturbance in the partial retention zone—is not reflective of current practice. The licensee began employing visual landscape design techniques and small patch sizes for cutblocks in 1994, and therefore higher plan view disturbance values than the mid point of the ranges are possible without compromising the scenic resource.

District staff indicate that, in fact, the values at the maximum end of the range for allowable plan view disturbance in the guidelines have been exceeded in the partial retention zone.

Upon review of the information regarding the management of visually sensitive areas on TFL 33, I accept that the constraints modelled in the base case of the analysis are not reflective of current practice. Given the value placed on the visual resource on TFL 33, and the implications for timber supply demonstrated in the sensitivity analyses of altering

constraints in the visually sensitive zones, I requested a more quantitative assessment of current practice which can be used to assess available timber supply for this determination.

In visually sensitive areas, visual impact assessments (VIAs) are conducted to assess the impact of proposed harvesting activities on visual quality from a perspective view in the preparation of operational plans. At my request, district staff reviewed VIA data to obtain an estimate of the disturbance levels being realized in current operations on the TFL. Given that the VIA data reflects the impact of actual operations, and has guided operational plan approvals for visually sensitive areas on the TFL, I believe it to provide the best reflection of current practices for this determination. The results of the review indicate that the current level of perspective view disturbance is near to or slightly exceeds the maximum value of the range in the provincial guidelines. In plan view, the measured disturbance level in the partial retention zone on the TFL was 20 percent, or equivalent to 5 percent greater disturbance than the maximum value of the range in the provincial guidelines, and 10 percent more than assumed for this zone in the base case. Staff confirm that this information provides the best available estimate of disturbance in current operations on the TFL.

District staff express some uncertainty as to whether this level of disturbance will be allowed to continue in the future, noting that in operational plan approvals, the district manager will likely seek to reduce the disturbance levels over time. Where assessments indicate that the disturbance levels recommended in provincial guidelines have been exceeded, licensee and BCFS staff are working to mitigate the visual impact in these areas. For example, in areas with older existing cutblocks, the disturbance levels exceed the VQOs largely because of their size and shape. Staff indicate that to reduce the visual impact, these areas may require modifications to cutblock boundaries and time to allow stands to grow and 'green-up'. Whether any operational restrictions in specific areas on this account will have implications for short-term timber supply is uncertain at this time.

Sensitivity analysis provided by the licensee tested the implications for timber supply of increasing disturbance in the retention, partial retention and modification VQO zones, first to the maximum value in the range provided in provincial guidelines, and then by one percent, two percent and five percent above the maximum value in the ranges. All other analysis assumptions were consistent with those used in the base case. The results indicate that each incremental increase in allowable disturbance resulted in a corresponding increase in timber supply relative to the base case. When the allowable disturbance was increased by 5 percent above the maximum value in the range, the initial harvest level could be maintained for the first decade at 20 950 cubic metres per year, before dropping in decade two to the long-term harvest level of 18 050 cubic metres per year. This sensitivity analysis is believed by both district and licensee staff to be the most reflective of current practice.

In visually sensitive areas, such as along the shores of Shuswap Lake, I note that planning of operations must be conducted in a manner which ensures scenic values are maintained. District staff state that while the allowable disturbance percentages have been exceeded on the TFL, they do not believe that the visual resource has been unduly compromised. Given the high recreational use in the area, I expect public input would have been

received regarding the operations on the TFL if past practices had impacted the visual resource in a manner unacceptable to the public. No public input was received on this issue in response to the draft management plan or timber supply analysis.

I note that MELP staff have expressed concern about the levels of allowable disturbance, questioning the deviation from the recommended VQOs in 1995 visual landscape inventory and provincial guidelines for maximum allowable disturbances in visually sensitive areas. District staff note that the recommended VQOs in the 1995 visual landscape inventory have guided operations on the TFL, but for portions of the TFL, the maximum disturbance values provided in provincial guidelines have been exceeded.

I accept the affirmation by district staff that scenic values on the TFL are being managed proactively and appropriately by the licensee, including the use of small cutblock sizes, reserve areas, and screening from benches to ensure protection of visual quality. As mentioned under *silvicultural systems*, the use of partial harvesting techniques are frequently considered to be an acceptable basis for exceeding the disturbance guidelines in visually sensitive areas. I also point out that VQOs have not yet been formally established for the area of TFL 33, which would provide greater clarity for the licensee around management objectives. I expect that, over the term of this determination, the district manager will clarify the management objectives for visual quality, and district staff will work towards the formal establishment of VQOs.

I am aware that the assumptions applied in the sensitivity analysis described above closely approximate the recommendations for the protection of scenic resources expected to arise from the LRMP process once finalized. I am also aware that the licensee has committed to manage to the requirements outlined in the LRMP, which district staff support as acceptable and appropriate management. MELP staff question any use of LRMP related projections at this time, given the preliminary status of that planning process. I note that, as stated in my 'Guiding Principles' and elsewhere in this rationale, I will not base a determination on recommendations which arise from plans not yet formally approved by government. In reviewing the information before me, I am mindful of constraints which reflect *current practices* for the management of scenic resources, rather than what may or may not arise from the LRMP process. When the LRMP is finalized, its recommendations can be reflected in a future determination.

I note that if reduced allowable disturbance values—compared to those reflected by current practice—were to form the basis for future management on the TFL, then analysis results indicate a declining timber supply on TFL 33, without accounting for any additional factors possibly acting to increase timber supply. Any changes to practices resulting from the clarification of management objectives for scenic areas will be reflected in future determinations.

In consideration of the information, I am satisfied that the additional data made available by the district review, in combination with the sensitivity analyses provided by the licensee, provides a satisfactory assessment of the timber supply available under current management practices including those for visual quality on TFL 33. My considerations of this information and the implications for timber supply on the TFL will be discussed under 'Reasons for decision'.

- recreation features

Shuswap Lake is a popular recreational destination for residents of BC, including visitors from the Lower Mainland. The area receives heavy seasonal use from cabin owners and campers who participate in a variety of water-based recreational activities. The lake is also renowned for houseboating, and is heavily used during the summer months by cruising houseboats filled with vacationers.

A recreation inventory was completed by BCFS district staff for the area of TFL 33. No recreation sites exist on TFL 33, and the licensee indicates that there is currently only very limited recreational use on the licence area. The timber supply analysis assumptions did not include any criteria specifically to account for management for recreation.

Recreational considerations for TFL 33 are largely related to visual resources and water quality. Although the landbase is not itself extensively used for recreation, the TFL is highly visible from the lake and cabin properties. Visual quality objectives are discussed in this rationale under *visually sensitive areas*. Water quality is discussed in the next section of this rationale.

I have considered this information and for this determination, I accept that the analysis assumptions regarding recreational use appropriately reflect current practice.

- water quality

Water quality for cabin owners requires consideration as there are many who depend on tributaries for their water supply. There are a number of licensed and unlicensed water users whose water supply originates from within the TFL 33 boundaries. In Management Plan Number 7, the licensee committed to conducting an inventory of licensed and unlicensed water users in the vicinity of the TFL 33.

No specific constraints were applied in the analysis to address water quality considerations. Operationally, the licensee has indicated that staff consult with water users in the vicinity of the TFL during the forest development planning process. A public meeting was held in August 1998 between the licensee and approximately 30 water users in the area. The licensee indicates in their management plan that they rely on consultation through direct referrals and the advertising of operational plans to identify concerns to be considered during forest operations.

I am aware that forest cover constraints for other resource values were applied in the analysis and that these constraints likely also provide accounting for water quality considerations. Therefore, having discussed this factor with district staff, I accept that I do not need to make an adjustment on this account in this determination.

Nevertheless, I note that water quality is an important consideration for which careful management must occur, in particular in management units such as this one where the potential for conflict exists. The level of recreational use associated with Shuswap Lake, in combination with the fact that there are domestic water licences on the TFL held by local residents, highlights the importance of ensuring harvesting and road construction is sensitive to requirements for water quality. The licensee compiled an inventory of licensed water users as a condition of the previous management plan, and has committed

in Management Plan Number 8 to consult with licensed water users potentially affected by operations on the TFL. I accept the licensee's intent to ensure that ongoing operations are meeting requirements, and I hold the licensee accountable to ensure operations do not compromise the water resource.

- cultural heritage resources

Cultural heritage resources include archaeological and traditional use sites. Archaeological sites contain physical evidence of past human activity, whereas traditional use sites may not necessarily contain historical physical evidence but may indicate current use by a First Nation. To help manage for unrecorded archaeological sites, archaeological overview mapping may be conducted to assign high, moderate or low ratings for archaeological potential within an area.

An archaeological overview assessment (AOA) has been completed for the Salmon Arm forest district, including TFL 33. District staff provided direction in February 2000 through a letter to licensees that outlined a methodology for performing archaeological impact assessments to ensure resource values are identified and protected. The licensee states in their management plan that where development may potentially impact on archaeological sites, archaeological impact assessments and band consultation is carried out to ensure measures are taken to protect the site.

The licensee indicates that no archaeological sites or traditional use sites have been found on TFL 33 to date. First Nations have indicated that they support the use of archaeological impact assessments to assist with the identification of resources.

In the timber supply analysis no specific reductions were applied to account for cultural heritage sites. Reductions applied for wildlife tree patches and riparian management areas typically provide some accounting for cultural heritage resources. District staff are satisfied that the analysis assumptions were appropriate given that no sites have yet been identified on TFL 33. Staff indicate that some archaeological sites may exist along the shoreline of Shuswap Lake but outside the TFL timber harvesting land base.

I am mindful of the licensee's commitment to work with First Nations operationally to ensure resource values are protected. Should any sites be identified in the future, they can be explicitly accounted for in future analyses. For this determination, I am satisfied that the analysis assumptions were based on the best available information regarding cultural resources, and make no adjustments on this account.

- riparian habitat

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting in order to protect riparian and aquatic habitats. For each stream, lake or wetland, the RRZ and RMZ make up the entire riparian management area. Stream classes (e.g., S1) are described in the *Riparian Management Area Guidebook* and are determined based on presence of fish, occurrence in a community watershed and average channel width criteria. The stream class is used to estimate the area required to be retained in the RRZ

and the area or volume to be retained in the RMZ. Similar criteria are used to classify lakes and wetlands and estimate reserve zone and management zone retention.

The approval of Management Plan Number 7 was contingent on the licensee's commitment to update stream inventories. The licensee completed a fish habitat assessment procedure in 1997 for the TFL area. At the time of the timber supply analysis, the licensee had completed stream classification for 10 percent of the streams on the TFL and licensee staff believed this to represent 95 percent of the fish-bearing streams. The classification of the remaining streams was estimated for the analysis based on gradient information.

MELP and licensee staff agreed that the assumptions in the timber supply analysis regarding the unclassified streams represented the best available information at the time of the analysis. Since that time, the licensee has completed their review of streams and has now met their management plan commitment to update stream inventories.

There are no class S1 streams on TFL 33. To account for management in reserve zones, the RRZ areas for class S2 and S3 stream, totalling 6 hectares, were entirely excluded from the timber harvesting land base. To account for the partial basal area retention in RMZs for class S2 to class S5 streams, the management zone widths were reduced using the basal area retention percentages, and then multiplied by the stream lengths. The resulting area was excluded from the timber harvesting land base. The RMZ retention for class S6 streams did not form part of the riparian reduction but an equivalent area was excluded as wildlife tree patches, as discussed under *stand level biodiversity*.

MELP staff note that the LRMP recommendations include detailed information about appropriate management for riparian habitat for streams. Once the LRMP has been formally approved by government, its recommendations may include requirements for riparian management areas additional to those required in current practice and reflected in the analysis. These additional requirements may include establishment of enhanced riparian reserves, and specific guidelines for various stream classifications. Whether such requirements would result in any impacts to timber supply additional to those of the requirements assumed in the analysis is unknown.

As I have noted elsewhere in this rationale, for this determination it would be inappropriate to account for impacts to timber supply which may result from LRMP recommendations not yet approved by government. The information does provide me with an assessment of potential risks to timber supply in the future. When any such recommendations become final and reflective of current practice, the assumptions can be revised and incorporated into future timber supply analyses.

No specific reductions were applied in the analysis to account for management requirements along the shores of Shuswap Lake. Lakeshore management requirements for lakes in the Kamloops Forest Region including Shuswap Lake are outlined by *the Lake Classification and Lakeshore Management Guidebook, Kamloops Region.* Requirements for Shuswap Lake include a 200 metre lakeshore management zone (LMZ) in which no harvesting is permitted. However, the majority of the LMZ area along Shuswap Lake is either private land or park. District staff indicate that the lakeshore

actually within the TFL is for the most part either inoperable or subject to retention visual quality constraints.

From review of the information, I am satisfied that incorporation of the lakeshore guidebook requirements would have a negligible impact on timber supply. I therefore believe there is no need to make an adjustment on this account for this determination. However, for future analyses for TFL 33, I recommend that the guidebook information should be reflected, to the extent it affects the timber harvesting land base of the TFL.

I have considered the information on riparian habitat. I am aware that although the licensee has now met the requirements outlined in the previous Management Plan for stream classification, this information was not available for the timber supply analysis. Nevertheless, I am satisfied that the stream information used in the analysis—which involved prioritizing the data needs and classifying the higher priority streams—represents the best information available at the time of the analysis, and is acceptable for use in this determination. However, the more comprehensive information on streams now available should be used for the next analysis for TFL 33. I also expect that the LRMP objectives will have been clearly articulated by that time and can be fully taken into account.

- wildlife habitat

The Conservation Data Centre of BC maintains forest district tracking lists, which name those species and plant associations considered to be at risk and which are known to occur, strongly expected to occur, or which have occurred in the past within a given forest district. The Identified Wildlife Management Strategy (IWMS) addresses habitat management for specific at risk species, as described in the next section.

1) identified wildlife

'Identified wildlife' refers to species at risk (red- and blue-listed) and to regionally significant species which are potentially impacted by forest management activities, and which have not been adequately accounted for with existing management strategies such as those for biodiversity, riparian management, ungulate winter range or through the application of other forest cover constraints. Species at risk as defined under the Forest Practices Code also includes those species that are not considered at risk provincially but which have regional populations that may be threatened. The intent is that by addressing the habitat needs of regionally important wildlife early on, the possibility may be avoided that at a later date they will become listed as threatened or endangered provincially.

Volume I of the Identified Wildlife Management Strategy (IWMS) was released in February 1999 and details several species which occur or potentially occur within TFL 33 and which require future consideration. These species include the following: bull trout, rubber boa, northern goshawk, fisher and grizzly bear. Volume II, which has yet to be released, may identify additional species.

Identified wildlife species will be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures (GWMs), or through other management practices specified in higher level plans. Specific WHAs or

management strategies for identified wildlife species have not yet been established on TFL 33, and no specific exclusions were applied in the base case of the analysis. For the short-term, it was assumed that the habitat requirements of identified wildlife could be largely addressed through riparian management areas, wildlife tree patches and other forest cover constraints applied in the analysis.

Government has limited the impact of management for identified wildlife in the short-term to a maximum of one percent of the short-term harvest level for the province. When WHAs are identified or established, and GWMs are implemented, the impacts on timber supply of management for identified wildlife will be more quantifiable. In addition, measures will be assessed over time to determine if they are sufficient to adequately protect identified wildlife species. The identified wildlife strategy and associated timber supply impact thresholds may be changed after such an evaluation, but I cannot reasonably speculate on the outcome of this process. In addition, I cannot speculate about decisions that may be made during future land and resource management planning processes with respect to identified wildlife. Any future changes to the required measures for identified wildlife species which result in impacts to timber supply, either under the identified wildlife management strategy or according to approved plans, will be incorporated into future determinations.

For this determination, it is not possible to specify the exact location or precise amount of habitat area that will be required within the timber harvesting land base to implement the IWMS. The Province has made a commitment to implementation of the IWMS and policy decisions include a projected one-percent impact on timber supply province-wide. In the majority of my determinations, I have found it appropriate to account for an expected but not fully quantified impact on the timber supply.

However, in the case of TFL 33, district and MELP staff indicate that establishment of WHAs is not expected to significantly affect the timber harvesting land base. The management considerations for grizzly bear—as discussed under *grizzly bear habitat*—that are currently described in the draft LRMP documents are related to forage production rather than to establishment of WHAs. No other species have yet been identified as requiring special consideration on TFL 33. Given the relatively small size of TFL 33, it is likely that the majority of requirements for identified wildlife will be met from adjacent management units, including the Okanagan TSA.

In consideration of this information, I am satisfied that implementation of the IWMS will not affect timber supply to any great extent on TFL 33, and in any event will result in much less than a one percent impact. For this determination, I will make no adjustments in this regard. Any changes in the information over time can be factored into future determinations.

2) deer winter range

A total of 2755 hectares, or 39 percent of the timber harvesting land base of TFL 33 provides winter range for resident deer. The majority of the area lies in the ICH biogeoclimatic zone. Approximately 74 percent of the winter range is in the partial retention VQO zone, with the remainder in the retention VQO zone.

Forest cover constraints were applied in the timber supply analysis to account for deer winter range, using information from the OKTHG which guide current operational practice. The constraints allowed for a maximum of 20 percent of stands on the forested land base to be less than 3 metres in height, and a minimum of 40 percent of stands on the timber harvesting land base to be greater than 20 metres in height at any time.

The constraints applied in the base case for visual resources in the retention and partial retention visual quality areas also served to meet the requirements for protecting mule deer habitat. As a result, the deer winter range requirements did not constrain timber supply beyond the constraints for visual sensitivity.

As discussed previously, the visual quality constraints applied in the base case are not reflective of current practice on the TFL. However, the sensitivity analyses subsequently provided, as discussed under *visually sensitive areas*, and that are assumed to better reflect current practice included the same forest cover constraints for deer as applied in the base case, and that currently guide operational practice on the TFL. Again, the deer winter range requirements did not constrain timber supply beyond the constraints for visual sensitivity.

MELP staff express concern about the assumptions in the analysis for deer winter range management requirements, noting that they expect the constraints to increase if the LRMP recommendations are formally approved and begin to guide operations. Under the LRMP, a forest cover constraint is recommended where at least 60 percent of the stands on the forested land base would be required to be 140 years of age or more for the deep snowpack zone. The total area of deer winter range within the deep snowpack zone on TFL 33 is 624 hectares. It is not yet known how much of this area is in the timber harvesting land base.

Once the LRMP is formally approved and its recommendations begin to be implemented, it will be possible to project any timber supply impacts which may result from the recommendations for deer winter range. As discussed under my guiding principles, it would be inappropriate for me to account for additional constraints possibly arising from the as yet unapproved LRMP. For this determination, the information regarding the draft recommendations gives me an assessment of possible risks to timber supply which may arise in the future. Any changes to operational practices which may arise from the formal approval of the LRMP and the implementation of the recommendations can be accounted for in future determinations for TFL 33.

I have reviewed the information and I am satisfied that deer winter range requirements as modelled in the analysis are reflective of current practice, and that the resource values are adequately addressed for this determination.

3) grizzly bear habitat

In the draft Okanagan LRMP, important grizzly bear forage production areas are identified within ESSFwc2 and ICHwk1 subzones. These preferred areas may overlap with TFL 33. In these areas, the proposals currently under consideration in the LRMP process include recommendations that some harvested areas be managed to enhance forage production, which could result in extended regeneration delays in specific areas.

Both licensee and district staff indicate that the management for forage production should pose no operational conflicts on the land base. District and MELP staff are satisfied that grizzly bear forage production requirements can be met operationally without impacting timber supply. As a result, no specific accounting for grizzly bear habitat requirements was necessary in the timber supply analysis.

Given the draft status of the LRMP recommendations, and that the recommendations are not expected to affect timber supply in any event, I am satisfied that there is no need to explicitly account for grizzly bear habitat requirements in this determination.

4) caribou habitat

No specific constraints were applied in the base case of the analysis to attempt to simulate the management considerations for caribou winter range, and this is reflective of current practice, as both licensee and district staff indicate that caribou winter range is not currently managed for in operational practice.

MELP staff have requested that the licensee manage for caribou habitat operationally but have issued no formal direction to the licensee to date. The draft forest cover constraints suggested by MELP staff to provide for caribou winter range habitat, are a minimum of 40 percent of the forested area in the identified caribou winter range should be covered with age class 8 stands (i.e. greater than 140 years of age). In addition, a minimum of 10 percent of this area should be in stands greater than 250 years of age.

A new caribou habitat inventory which included the area of TFL 33 was completed in preparation for the LRMP. A total of 1607 hectares or 23 percent of timber harvesting land base, covering the north-eastern portion of TFL 33 have been identified as caribou winter range area. District staff note that there is very little overlap between caribou and mule deer winter range areas, as caribou tend to primarily use forests in the ESSF biogeoclimatic zones.

As discussed elsewhere, I am satisfied that it is not appropriate at this time to account for constraints arising from the draft LRMP recommendations. I also note that MELP staff have indicated that the direction given in the draft LRMP recommendations is that the timber supply impacts arising from the establishment of caribou reserves would not be additional to those arising through the landscape unit planning process, including the establishment of biodiversity emphasis options (BEOs), discussed further under *landscape level biodiversity*.

Although I am satisfied that current practice has been modelled, I am concerned that operationally there has not been a plan in place for management of caribou habitat. Given the known presence of this species in the TFL and the sensitivity of caribou herds to disturbance, I request that the licensee clarify their management intentions for caribou habitat consistent with what recommendations arise from the LRMP prior to the next determination for TFL 33.

- stand-level biodiversity

Biodiversity is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems and the evolutionary and functional processes that link them. Under the Forest Practices Code, biodiversity in a given management unit is assessed and managed at both the stand and landscape levels.

Stand-level biodiversity management includes retaining wildlife tree patches (WTPs), within or adjacent to cutblocks to provide structural diversity and wildlife habitat. The *Biodiversity Guidebook* makes recommendations for percentages of area to be retained in WTPs, based on specific assumptions about the land base. *The Landscape Unit Planning Guide* reflects the principles described in the *Biodiversity Guidebook*, and describes the policy on the implementation of biodiversity management. Where landscape unit planning has not been completed and objectives have not been set, table A3.2 in the *Landscape Unit Planning Guide* recommends retention rates for WTPs.

Operationally, district staff have advised licensees that pending completion of the LRMP, wildlife trees will be retained in a ratio of approximately nine percent of cut block areas, and at a maximum distance between patches of approximately 500 metres. For the purposes of the analysis, it was assumed that nine percent of the entire productive forest land base of the TFL—including areas already excluded for other purposes—would be used to meet the WTP requirement. The licensee calculated the amount of productive forest already excluded in the analysis, in order to determine the additional exclusion to apply to the timber harvesting land base by biogeoclimatic subzone. It was determined that 433 hectares or 5.6 percent of the productive forest had already been excluded for other purposes, and so therefore an additional 266 hectares or 3.4 percent of the productive forest were excluded to fully account for stand level biodiversity.

I have considered the information regarding stand level biodiversity for TFL 33 and believe that the assumptions applied in the timber supply analysis were reasonable and consistent with provincial policy.

Therefore, I accept for this determination that stand level biodiversity has been adequately accounted for in the analysis, and make no adjustments in this regard.

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species that are dependent on or are strongly associated with old-growth forests. Although some general forest management practices can broadly accommodate the needs of most ecosystems, more often a variety of practices is needed to represent the different natural disturbance patterns under which ecosystems have evolved.

The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. A landscape unit is an area established by the

district manager, generally up to 100 000 hectares in size, based on topographic or geographic features such as a watershed, or series of watersheds, to manage biodiversity and other forest resource values. The area of TFL 33 forms part of one draft landscape unit known as the Anstey Landscape Unit, which is shared with the Okanagan TSA.

The *Biodiversity Guidebook,* the *Landscape Unit Planning Guide* and *Higher Level Plans: Policy and Procedures* (Policies and Procedures) all provide policy and guidance on management for landscape-level biodiversity. The *Landscape Unit Planning Guide* provides guidance on which components of the full range of recommendations included in the *Biodiversity Guidebook* should be implemented to achieve a balance of forest management objectives. The *Landscape Unit Planning Guide* contains forest cover requirements for old seral forest that are to be applied at the biogeoclimatic variant level within each landscape unit. The requirements are stated as a minimum percentage of the productive forest to be retained in stands above a specified age that varies by ecosystem type. The guide also allows the old-seral requirement to be phased in over time in landscape units subject to a lower BEO.

The 1996 Higher Level Plans: Policy and Procedures guide provides further policy guidance. It outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—that may be employed when establishing biodiversity management objectives for a landscape unit. To achieve a balance between biodiversity and timber supply objectives, this guide recommends the application of a mix of BEOs in each subregional planning area. The proportions of a planning area subject to lower and intermediate biodiversity emphasis should range from 30 to 55 percent, with the average at approximately 45 percent of the area subject to lower, 45 percent to intermediate, and 10 percent to a higher BEO.

The policy generally followed for timber supply analyses when landscape units and BEOs have not been established is to model the distribution of BEOs using an average forest cover requirement weighted to reflect the 45-45-10 mix of BEOs. The BEO for the landscape unit in which TFL 33 is situated has not yet been established, so the weighted average approach was used in the analysis.

There are three issues related to the assumptions applied in the analysis for landscape level biodiversity on TFL 33, and these issues are discussed in the following sections.

1) one-third drawdown

In timber supply analyses, forest cover constraints for old-seral forest—including the phase in of requirements for lower BEOs—are to be applied in accordance with the *Landscape Unit Planning Guide.* As mentioned previously, the guide states that forest cover requirements for old seral forest are to be applied at the biogeoclimatic variant level within each landscape unit as a minimum percentage of the productive forest to be retained in stands older than the old seral (140 years of age or 250 years of age, depending on the natural disturbance type).

For landscape units with area subject to lower BEOs, the *Landscape Unit Planning Guide* allows for the old seral requirement to be phased in over time. However, the timber supply model used does not allow for constraints to change over the modelling

timeframe, and consequently the full old seral retention requirement was applied. A review of the results of the analysis indicated that this was not a limiting factor for short-term timber supply. However, the constraint as modelled did reduce timber supply in the mid- to long-term in the base case.

District staff indicate that the LRMP recommendations are expected to result in a low BEO emphasis for TFL 33. The implications of this for timber supply can be factored into future analyses, once the LRMP recommendations are formally approved by government.

I have reviewed the analysis assumptions regarding the application of the old seral requirements and am mindful that the current policy direction indicates the requirements be phased in over time for that area subject to lower BEOs, rather than applying the full requirement immediately. The modelling assumptions were thus more constraining on timber supply as described above. I will discuss this further in my 'Reasons for decision'.

2) inclusion of non-productive forest

According to table 2.5 in the *Landscape Unit Planning Guide*, 'There are various classes of non-productive areas. Two of the classes have tree species associated with them and may be appropriate to contribute to old growth requirements. The two classes are Alpine forest (with species) and non-productive forest (with species). There are some inventory typing problems where occasionally some of the areas have been misclassified, therefore these areas should be examined for their suitability, and should be included…where appropriate.'

For the analysis, the licensee assumed the inclusion of those portions of the non-productive forest on the TFL with assigned species labels in the old seral forest contribution to landscape level biodiversity requirements would approximate the intent of this table. As a result, 284 hectares of non productive land which included 251 hectares classified as alpine forest, were considered to contribute to old seral forest requirements. However, although licensee staff have conducted an aerial photo review of the areas, they have not conducted a field review to examine their suitability for meeting old seral forest requirements.

I have reviewed the inventory information available on these areas, and I note that the inventory file data indicates that the current forest cover is mostly either early or mature seral forest. These areas would not have contributed to old seral requirements in the analysis until the mid to long-term, and at a time when the landscape unit would likely have greater proportions of old seral forest. As a result, the impact to timber supply of excluding these non-productive areas from contributing to the objectives for the maintenance of old seral forest would affect the medium to long-term only, and is likely small enough to be insignificant.

I encourage the licensee to conduct field assessments to verify the suitability of these areas to contribute to old seral forest requirements. Until these assessments are available, I am not willing to consider the contribution of these non-productive areas. However, I am satisfied from review of the information that the impact to mid and long-term timber supply is negligible, and make no adjustments on this account.

3) contribution from non-TFL lands

As mentioned previously, TFL 33 falls into the Anstey Landscape Unit, a single draft landscape unit that is shared with the Okanagan TSA. For the analysis, the licensee assumed that old seral forest from outside of the TFL but within the landscape unit would contribute to the TFL's requirements. More specifically, the licensee proposed that all older non-contributing lands in the entire landscape unit be combined, and a single percent contribution from timber harvesting land base be calculated and applied to both TFL and the TSA lands. In the analysis, a small area from the Okanagan TSA was assumed to contribute to landscape level biodiversity requirements for the TFL.

The extent of sharing of old seral forest requirements between administrative units within a single landscape unit will be clarified when landscape unit planning has been completed, and old growth management areas (OGMAs) are established. Until that time, the timber supply implications to each administrative unit of meeting old seral forest requirements on the landscape unit as a whole are uncertain.

In the interim, it has generally been assumed in timber supply analyses that each administrative unit must proportionally meet its own old seral forest requirements, under the assumption that this will ensure that the entire landscape unit will meet its old seral forest requirements. The exception has been that established parks are allowed to contribute proportionally to old seral forest requirements for adjacent management units.

I note that the timber supply analysis for the Okanagan TSA that has recently been completed did not assume any combined contributions from TFL 33 to meeting old seral forest requirements for the landscape unit in question. This further illustrates the uncertainty around the assumptions applied for TFL 33.

Sensitivity analysis results indicate that modifying the assumptions applied in the TFL 33 analysis to assume no contribution to old seral requirements from outside the TFL leads to a two and six percent reduction in short- and mid-term timber supply.

District staff indicate that the current LRMP identifies three proposed protected areas within the Anstey Landscape Unit, which encompass approximately 8000 hectares. If these areas were to be established as protected areas, it is likely that they will contain forests that could contribute to meeting old seral requirements in the landscape unit that encompasses TFL 33.

From review of the information, before landscape unit planning is completed I consider there to be too much uncertainty regarding sharing of contributions to old seral requirements amongst neighbouring administrative units within the landscape unit that encompasses TFL 33. For this determination, I consider it more prudent to assume that old seral forest requirements must be met within the TFL without contributions from the rest of the landscape unit. The sensitivity analysis results provide an indication of the timber supply implications resulting from meeting this requirement. I will discuss this further under 'Reasons for decision'.

Over the time that this determination is in effect, I expect that greater clarity will be achieved on these issues once the LRMP is finalized, allowing for completion of the

landscape unit planning process and formal establishment of the OGMAs by the district manager.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber;

Other information

- strategic plans

Strategic plans establish the broader context for operational plans by providing objectives for managing forest resources in a given area. There are several types of planning processes which are described as strategic in relation to operational planning processes. Distinction must be made between higher level plans as defined by the Forest Practices Code and strategic land use planning processes such as regional or subregional planning (land and resource management planning). Portions of plans arising from strategic planning processes may be declared as higher level plans under the Forest Practices Code. A higher level plan defined under the Forest Practices Code establishes government's social, economic and environmental objectives, thereby setting the resource management context for developing subsequent operational plans.

Land and resource management planning is an integrated sub-regional planning process involving significant public participation. Completed and approved plans establish direction for land use and specify broad resource management objectives and strategies for the plan area. The objectives defined through the LRMP process can reach higher level plan status under the Forest Practices Code if officially declared as such by government, but do not have to be designated in this manner in order to influence resource management.

The Okanagan-Shuswap LRMP covers approximately 2.5 million hectares, encompassing the Penticton, Salmon Arm and Vernon Forest Districts. The plan was initiated in 1995 and has now been ratified by the participants and submitted to Cabinet for approval. The LRMP includes recommendations for land use, protected areas, and the management of visual quality, caribou habitat, deer habitat, grizzly bear habitat and riparian values over the area the plan encompasses.

As part of the original timber supply analysis submission, a scenario was provided by the licensee which involved the use of assumptions about the guidelines then available in the draft Okanagan-Shuswap Land and Resource Management Plan (LRMP). The licensee provided many harvest forecasts, including an alternative base case, which incorporated assumptions based on the current draft LRMP recommendations. The Okanagan-Shuswap LRMP has been ratified by the LRMP table but has not yet been approved by Cabinet. Consistent with my guiding principles, I cannot reasonably base any AAC determination on harvest level projections which have incorporated assumptions around the draft plan, given that this LRMP has not yet been approved by government. It would be inappropriate for me to base my determination on harvest forecasts which are based on a series of speculative assumptions about the final outcome of an incomplete planning process. However, for some factors, the analysis has provided me with insights into the

dynamics of the harvest flow under base case management assumptions, and where this has been the case I have discussed it in this rationale under the appropriate section.

I note that the timber supply projection resulting from the sensitivity analysis which I have determined to best represent current practice, including those for visual quality, is similar to the projection resulting from the series of harvest flows which were purported by the licensee to simulate the constraints arising from the LRMP. However, as described above, I will not take into account any assumptions about management constraints or land use which are based on the LRMP recommendations until the plan is formally approved by government. As discussed under visually sensitive areas, my considerations for this determination of the constraints resulting from management of the visual resource are explicitly linked to what represents current practice.

When the LRMP has been formally approved by government, the implications for timber supply of implementing its recommendations will be accounted for in a future determination.

- twenty year plan

The licensee has submitted a twenty year plan based on the harvest levels projected for the first twenty years in the alternative base case option and which incorporated the draft LRMP recommendations, including those for visual quality. This plan indicates that it is feasible to initially harvest the current AAC of 22 500 cubic metres per year under these alternative management assumptions. District staff note that the twenty year plan has been accepted by the district manager.

I have considered the information and am mindful that the twenty year plan assessed the operational availability of wood supply using a set of assumptions which are purported to be based on the draft LRMP recommendations. I have expressed my views on the appropriateness of my accounting for the LRMP at this time elsewhere in this document. Notwithstanding this point, district staff indicate that based on current practices, the TFL land base is physically very accessible for timber harvesting and is subject only to the constraints to protect other resource values, as referenced throughout this document. The information in the plan provides me with an assessment of the physical and spatial availability of wood supply, based on a set of assumptions that can be interpreted as a reasonable proxy for current practices. I am mindful that it has not identified any concerns regarding the accessibility of timber volume over the next twenty year period, and I therefore accept it as a reasonable validation of the spatial feasibility of the harvest level.

<u>Alternative rates of harvest</u>

- harvest flow/socio-economic implications

The nature of the transition from harvesting old growth forests to harvesting second growth forests is a major consideration in determining AACs in many parts of the province. In the short-term, the presence of large timber volumes in older forests often permits harvesting above long-term levels without jeopardizing future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have

been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

For TFL 33, the licensee found it was not possible to provide alternative harvest flows due to the highly constrained timber supply indicated in the base case. I am aware that alternative flows would likely have been possible to produce given the VQO constraints applied in current practice—as discussed under *visually sensitive areas*—rather than the more constraining VQOs modelled in the base case.

- community dependence on the forest industry

All forestry and harvesting activity on TFL 33 is conducted by local independent contractors. The licensee has operated in the Shuswap area since 1945. The Salmon Arm community is dependent on the total operations of the licensee, and the harvested timber volume from TFL 33 contributes approximately six percent to its local mill operation. The licensee employs 330 people in their milling and woodland operations. Approximately 58 percent of their employees live in Salmon Arm, 12 percent in Canoe, seven percent in each of Sicamous and Enderby and the remainder in other small communities in the area. In addition, the licensee supports approximately 200 people annually through contracted harvesting operations, and 55 people in reforestation and other silviculture programs.

I have reviewed the information and am mindful that while TFL 33 on its own provides a small proportion of the licensee's total volume harvested, the licensee's total operations provide a significant contribution to the employment in the local area.

- difference between AAC and actual harvest

As a normal standard, most licencees have some flexibility in their annual rate of cut during a five-year period referred to as the cut control period. The volume harvested must be within 50 percent of the allowable annual volume in each year (annual cut control), and also within 10 percent of the allowable volume for the five year period (periodic cut control).

The licensee for TFL 33 was granted periodic cut control in January 2000 under section 64(5) of the *Forest Act*. This flexibility was granted in consideration of several factors, including the small harvest level of this management unit as well as an understanding that the removal of annual requirements would not negatively impact the land base of the TFL.

District staff indicate that in recent years, the licensee has harvested the AAC for the TFL within both annual and periodic cut control requirements.

I have reviewed this information and am aware of no issues which would impact this determination.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities;

Timber processing facilities

- existing mills

The licensee operates a sawmill and plywood operation in Canoe, which is located in the proximity of the TFL. Most of the wood harvested from TFL 33 is used by the licensee's manufacturing facilities. A small amount of volume is traded as poles to local pole companies, and pulp quality wood is traded to chipping facilities or pulpwood operations.

The sawmill in Canoe can process 230 000 cubic metres per year, and the plywood operation 170 000 cubic metres per year when operating at the full three shift capacity. According to the licensee, the plywood plant is currently operating three shifts, and the sawmill is operating two shifts. The licensee's harvest from TFL 33 supplies approximately 6 percent of the primary milling requirement for these facilities.

The licensee notes that TFL 33 contributes a relatively small proportion of the total milling capacity, but is considered an important component of the licensee's operations.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia;

Economic and social objectives

- Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). These economic and social objectives are an important consideration in my determination of an AAC for TFL 33.

This letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

I have considered the contents of the letter and memorandum in my determination of an AAC for TFL 33. I note that commercial thinning is not currently part of the management regime on TFL 33, and that the current stand structure does not support

further consideration of commercial thinning at this time. In addition, I have considered the applicability of a partition on the TFL and am satisfied that there are no concerns which would warrant instituting a partitioned component in the AAC for this determination.

- local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

The licensee for TFL 33 advises that it actively solicited input on Management Plan Number 8. This included advertising in local newspapers and the Gazette of the availability for public review the draft statement of management objectives, options and procedures (SMOOP) and of the draft Management Plan, which included the timber supply analysis report. Known users of TFL 33, including licensed water users, were also notified in writing of the availability of these documents for review.

Public input was received from one cabin owner regarding water quality, which is discussed under that section of this rationale. No other public input was received. I believe that the licensee has carried out its public involvement obligations satisfactorily and I do not have any concerns in this regard for this determination.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Abnormal infestations and salvage

- unsalvaged losses and salvage program

Unsalvaged losses are timber volumes destroyed or damaged by causes such as fire and disease that are not recovered through salvage operations. There are a number of parasites, fungi or plants that can kill trees or degrade the quality and value of logs.

Estimates for unsalvaged losses account for epidemic (abnormal) infestations that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are mostly accounted for in inventory sampling for existing timber yield estimation or though other methods. Losses associated with second-growth stands are addressed by application of operational adjustment factors (OAFs) as noted previously in this rationale.

The values applied in the analysis to account for non-recoverable losses are based on historical as well as recent salvage data. Volume lost to insects and disease is assumed to be approximately 75 percent salvaged, with the remainder lost. All damage caused by wind was assumed to be unsalvaged. In total, 450 cubic metres per year was assumed lost on the TFL as a result of insect, disease and wind damage.

I am aware that the uncertainty around the incidence of root rot, as discussed earlier under *operational adjustment factors,* pertains as well to unsalvaged losses. Clarity would also be provided for this factor if local data can be accumulated prior to the next timber supply analysis. I strongly encourage district and licensee staff to work together to obtain clearer

information about the prevalence and expected implications to timber supply of root rots prior to the next analysis for TFL 33.

For this determination, in the absence of evidence to the contrary I accept that there has been adequate accounting for unsalvaged losses and make no adjustments in this regard.

Reasons for Decision

Some of the factors discussed previously in the rationale can be grouped into those which indicate the timber supply as projected in the base case is overestimated and those which indicate it is underestimated.

For this determination, there are three factors which have been identified as likely having an unquantified downward influence on the timber supply projected in the base case, as follows:

- *economic and physical operability* – an area of between 0 and 265 hectares in size which has been included in the timber harvesting land base has greater than 70 percent slope and is considered to be inoperable;
- *operational adjustment factors* (OAFs) – as a result of the expected high incidence of root rot on the TFL, the operational adjustment factors applied to the managed stand yield curves in the analysis should likely be greater, which results in an unquantified reduction in mid- to long-term timber supply;
- *landscape level biodiversity* – an adjustment to remove the assumed contribution from non-TFL lands to old seral retention requirements results in a small reduction in short- to mid-term timber supply.

There are also three factors which indicate that timber supply as presented in the base case may be underestimated:

- *site productivity estimates* – the likelihood that managed stands on TFL 33 will exhibit better growth and productivity than indicated by the data on the inventory file indicates an unquantified upward influence on long-term timber supply;
- *landscape level biodiversity* – an adjustment to account for the immediate application of full old seral retention requirements, instead of the phase in of the requirements over three rotations, indicates a small upward influence on timber supply;
- *visually sensitive areas* – an adjustment to account for disturbance levels currently allowed in the visually sensitive portions of the TFL, rather than the values assumed in the base case, results in a significant increase in timber supply compared to the base case projection.

In my estimation, the risk posed to mid- and long-term timber supply by the likelihood that larger operational adjustment factors should be applied to account for the effect of root rot on managed stand yields is offset by the likelihood that timber supply is more favourable over that same period as a result of the greater site productivity of second growth stands than assumed in the base case. I anticipate that greater clarity around the timber supply impacts of root rot damage in second growth forests will be gained

provincially over the next five year period. Likewise, refined site productivity information will result in better estimates of available timber supply for future determinations. In any event, these are both longer term issues of which I am mindful but which I believe I do not need to further take into account for this determination.

With respect to the remainder of the factors mentioned above, all—with the exception of *visually sensitive areas*—suggest that the timber supply projected in the base case is over or underestimated by only a small amount. I expect that the short- to mid-term upward influence on timber supply resulting from the application of the full old seral requirements in the base case is largely offset by the small downward pressure posed by disallowing any contribution to old seral from the adjacent TSA. The possible overestimation in the size of the timber harvesting land base resulting from the operability methodology is in all likelihood much less than the total area in the slope class in question. Given the range of uncertainty around the value, and the relatively small size of the land base affected, I am satisfied that it is not necessary to further account for the implications to timber supply until a more accurate estimate of the operable area is available.

The factor with the greatest influence on timber supply in the TFL is the choice of management practices for visual quality. Given the high value of the visual resource on Shuswap Lake, three quarters of the land base on TFL 33 is considered visually sensitive. As discussed earlier in this rationale, the timber supply constraints modelled in the base case, which were based on an interpretation of the current guidelines for the management of visual quality led to a highly constrained timber supply projection where the initial harvest level achievable is only 37 percent of the current AAC. However, as noted earlier in this document, it is my view that the analysis assumptions are not actually reflective of current practice. As a result, the base case harvest projection does not provide an accurate reflection of the actual harvest available from TFL 33 under current management as applied on the ground, as opposed to an interpretation of the guidelines applied during modelling.

District staff indicate, based on the review of visual impact assessment data conducted at my request, that current allowable disturbance percentages in the partial retention zone are currently in the range of 20 percent. In the absence of any additional information to provide greater clarity around current management, I accept that this value—which I note was derived from actual practices on the ground—is more representative of current practice than the constraints applied in the base case. The sensitivity analysis in which the timber supply implications of similar maximum disturbance levels was assessed, indicates an initial harvest level of 20 950 cubic metres per year is obtainable.

In consideration of the above information, I am satisfied that the harvest flow possible under current management, which provides appropriate consideration for the resource values influencing operations, is in the range of 21 000 cubic metres per year.

I believe that this harvest level, which represents a reduction of 6.7 percent from the current harvest level for TFL 33, is appropriate given the information presented to me about the management practices and resource values present on TFL 33. In particular, I am aware of the uncertainty around future practices with respect to visual quality, and I

believe a reduction in harvest level in this determination is consistent with the range of expected outcomes from possible future management direction, as well as allowing district staff the flexibility to resolve outstanding issues around visual quality prior to the next determination.

As a further observation, and for context only, I am satisfied from the information discussed throughout this rationale that this harvest level is not inconsistent with the direction and trends likely from the LRMP, although it has not yet been formally approved by government and therefore is subject to change until that time.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved on TFL 33 by establishing an AAC of 21 000 cubic metres.

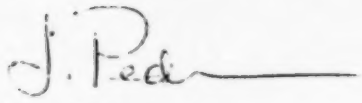
This determination is effective December 21, 2000, and will remain in effect until a new AAC is determined, which must take place within five years of the date of this determination.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability of staff to undertake these projects is dependent on available staff resource time and funding. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply on TFL 33. I recommend the following:

- that district staff clarify the appropriate management objectives for TFL 33 with respect to visual quality, prior to the next determination;
- that district staff monitor operations on TFL 33 to ensure that the visual quality objectives are being met;
- that district and regional staff work with the licensee to determine if larger operational adjustment factors are required to account for volume losses arising from root diseases.



Larry Pedersen
Chief Forester

December 21, 2000

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silviculture treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

(a) encourage maximum productivity of the forest and range resources in British Columbia;

(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and

(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
Ministry of Forests

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis.*

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests